HOTWIRE
MODEL 7924 STANDALONE
T1 HDSL TERMINATION UNIT

USER'S GUIDE

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PARADYNE™

Warranty, Sales, and Service Information

Contact your sales or service representative directly for any help needed. For additional information concerning warranty, service, repair, spare parts, installation, documentation, or training, use one of the following methods:

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  — Within the U.S.A., call 1-800-870-2221
  — International, call 727-530-2340

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Important Safety Instructions

1. Read and follow all warning notices and instructions marked on the product or included in the manual.

2. Do not allow anything to rest on the power cord and do not locate the product where persons will walk on the power cord.

3. Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous high voltage points or other risks. Refer all servicing to qualified service personnel.

4. General purpose cables are provided with this product. Special cables, which may be required by the regulatory inspection authority for the installation site, are the responsibility of the customer.

5. When installed in the final configuration, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.

6. A rare phenomenon can create a voltage potential between the earth grounds of two or more buildings. If products installed in separate buildings are interconnected, the voltage potential may cause a hazardous condition. Consult a qualified electrical consultant to determine whether or not this phenomenon exists and, if necessary, implement corrective action prior to interconnecting the products.

7. In addition, if the equipment is to be used with telecommunications circuits, take the following precautions:

   — Never install telephone wiring during a lightning storm.

   — Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.

   — Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.

   — Use caution when installing or modifying telephone lines.

   — Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.

   — Do not use the telephone to report a gas leak in the vicinity of the leak.

EMI Warnings

⚠ **WARNING:**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The authority to operate this equipment is conditioned by the requirements that no modifications will be made to the equipment unless the changes or modifications are expressly approved by Paradyne Corporation.

⚠ **WARNING:**

To Users of Digital Apparatus in Canada:

This Class A digital apparatus meets all requirements of the Canadian interference-causing equipment regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du règlement sur le matériel brouilleur du Canada.

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About This Guide

Document Purpose and Intended Audience

This guide contains information needed to set up, configure, and operate HotWire Model 7924-A1 T1 HDSL termination units. It is designed for central office technicians or network engineers who have an understanding of the deployment of digital subscriber line systems in a telephone company or private network environment.

HotWire 7924 may be ordered either as a standalone unit (7924-A1-xxx) or as a nest-mounted card (7924-B1-xxx) that fits in a HotWire 7900 nest. This guide describes the installation and maintenance procedures for the standalone version, Model 7924-A1-xxx.

Document Summary

Section	Description
Chapter 1	*About HotWire Model 7924 Termination Units*. Describes the features of each version of the Model 7924, and typical configurations.
Chapter 2	*Installing the Unit*. Describes how to install the unit and make connections.
Chapter 3	*Using Terminal and Switchpack Modes.* Provides instructions for connecting a VT100-compatible terminal user interface. Also describes how to make manual configuration changes directly on the board hardware.
Chapter 4	*Customizing DSX-1-Compatible Units*. Provides instructions for modifying configuration options by using the terminal interface or DIP switches and jumpers on the board.
Chapter 5	*Customizing V.35-Compatible Units*. Provides instructions for modifying configuration options by using the terminal interface or DIP switches and jumpers on the board.

Section	Description
Chapter 6	*Monitoring the Unit.* Describes how to monitor unit status, LEDs, and network statistics. Also describes how to monitor the status of the unit on the opposite side of the HDSL connection.
Chapter 7	*Testing.* Provides information about available loopback tests.
Appendix A	*Worksheets.* Contains all the configuration options, default settings, and possible settings to use for planning.
Appendix B	*Cable Pin Assignments.* Contains connector and interface details.
Appendix C	*Switchpacks and Jumpers.* Defines the switchpack and jumper positions on the board hardware. Includes board layout diagrams.
Glossary	Defines acronyms and terms used in this document.
Index	Lists key terms, acronyms, concepts, and sections in alphabetical order.

Product-Related Documents

Document Number	Document Title
7900-A2-GB20	*HotWire Model 7900 Basic Maintenance Processor User's Guide*
7900-A2-GB21	*HotWire Model 7900 SNMP Maintenance Processor User's Guide*
7900-A2-GN10	*HotWire Model 7900 10-Slot Standalone Shelf Installation Instructions*
7900-A2-GN20	*HotWire Model 7900 Nest and Options Installation Guide*
7920-A2-GB20	*HotWire Models 7924 and 7925 T1 and E1 HDSL Nest Card Termination Units User's Guide*
7925-A2-GB20	*HotWire Model 7925 Standalone E1 HDSL Termination Unit User's Guide*

To order additional product documentation, refer to *Warranty, Sales, and Service Information* on page A at the beginning of this User's Guide.

About HotWire Model 7924 Termination Units

1

HotWire 7924-A1 Models and Features

Products in the HotWire 7924 family provide "last mile/last kilometer" transport of T1-compatible circuits between customer facilities and central site equipment over 2- or 4-wire copper lines. The units can be used over distances substantially exceeding traditional T1 spans and Canadian Standards Association (CSA) loop standards.

HotWire 7924 standard features include:

- V.35 or DSX-1 interface

- Full support for T1 using two twisted-copper pairs

- Full support for fractional T1 using one or two twisted-copper pairs

- Automatic detection and compensation for inverted pairs and swapped loops, which simplifies installation

- Tolerance of bridged taps

- Local and remote alarm surveillance

- Local and remote T1 network and HDSL loop performance monitoring

HotWire 7924 may be ordered either as a standalone unit (7924-A1-xxx) or as a nest-mounted card (7924-B1-xxx) that fits in a HotWire 7900 nest. This guide describes the installation and maintenance procedures for the standalone version, Model 7924-A1-xxx.

Up to ten standalone units may be installed in an optional HotWire 7900 10-Slot Standalone Shelf. This is a convenient way to stack standalone units, using a single power source.

To order additional product documentation, refer to *Warranty, Sales, and Service Information* on page A at the beginning of this User's Guide.

There are several versions of the Model 7924-A1, each supporting a different interface (DSX-1 or V.35) and power supply (120 Vac, 230 Vac, or −48 Vdc):

Model Number	Features
7924-A1-201	1.544 Mb/s DSX-1 compatible. Connection to 120 Vac power supply.
7924-A1-202	1.544 Mb/s V.35 compatible. Connection to 120 Vac power supply.
7924-A1-301	1.544 Mb/s DSX-1 compatible. Connection to 230 Vac power supply.
7924-A1-302	1.544 Mb/s V.35 compatible. Connection to 230 Vac power supply.
7924-A1-501	1.544 Mb/s DSX-1 compatible. Direct connection to −48 Vdc power supply. For use in a HotWire 7900 10-Slot Standalone Shelf only.
7924-A1-502	1.544 Mb/s V.35 compatible. Direct connection to −48 Vdc power supply. For use in a HotWire 7900 10-Slot Standalone Shelf only.

Typical Configurations

HotWire Model 7924 standalone units can be used in campus applications where long loop distances normally require the campus to contract with the local telephone exchange carrier to deliver private line services across the campus.

Figure 1-1 shows two typical campus applications where remote PBXs or multiplexers are interconnected across a campus using two HotWire Model 7924 standalone units. In each pair, one unit is configured as a central site or central office (CO) unit and the other is the remote or customer premises (CP) unit.

The HotWire Model 7924 standalone unit is configured at the factory to operate at the CP side of a T1 HDSL connection. (Conversely, HotWire Model 7924 nest cards are configured for CO operation.) The central site unit must be reconfigured for CO operation in these configurations.
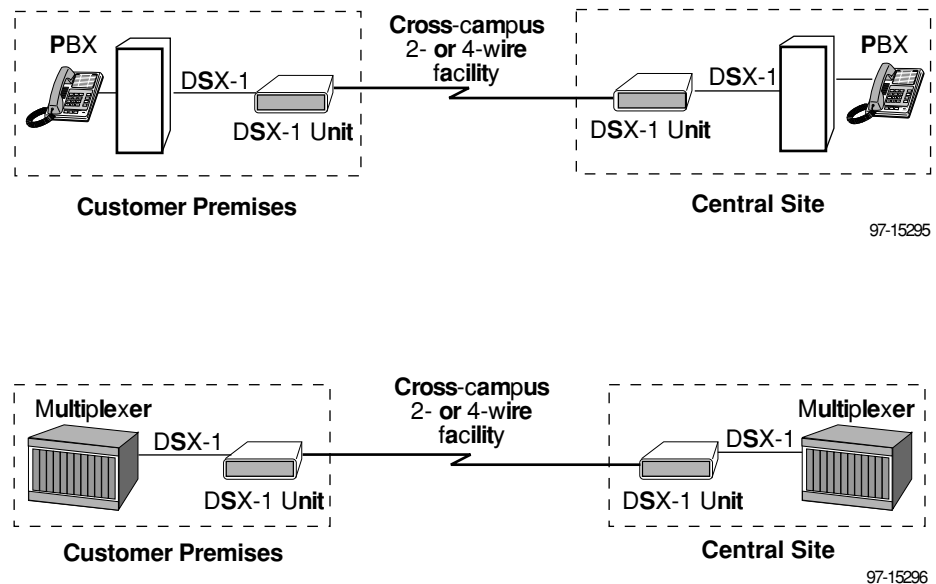
Figure 1-1.   Campus Network Applications

HotWire Model 7924 standalone units are also ideal for delivering T1 services from a central site to the customer premises over long loop distances without repeaters.

Figure 1-2 shows a central-site application with a HotWire 7900 Nest containing HotWire Model 7924 nest cards. The nest cards at the central site each terminate a single HDSL subscriber line. Each line is then converted to a DSX-1 interface for connection to other central office equipment, such as a digital cross-connect system (DCS).
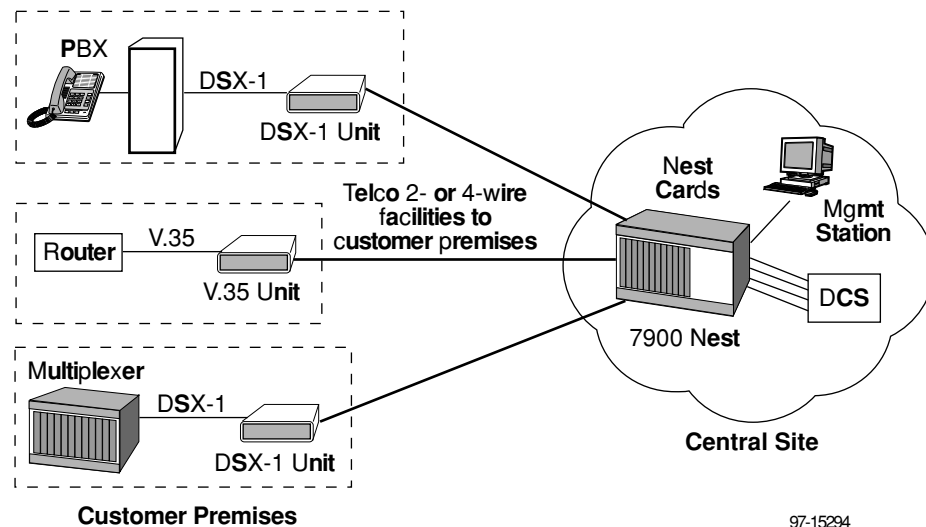
Figure 1-2.   T1 Extension to Customer Premises

Cellular network providers must lease large numbers of T1 circuits in order to connect remote cell sites to mobile telephone switching offices (MTSOs). HotWire Model 7924 products provide an alternative to standard repeatered T1 services. Figure 1-3 depicts a typical cellular network access application.
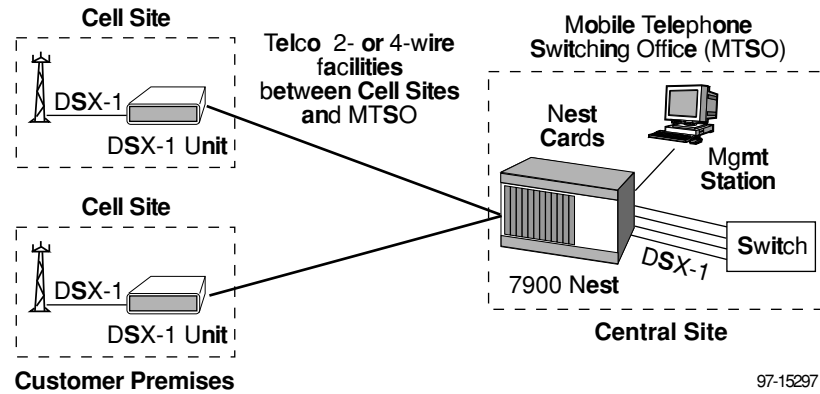
Figure 1-3.   Cellular Network Access

User Interface Types

There are three types of user interfaces to the standalone units:

- VT100-compatible terminal interface (see Chapter 3)

- Manual setting of switches and jumpers (see Chapter 3)

- Front Panel LED status indicators (see Chapter 6)

Installing the Unit

2

Overview

This chapter describes the procedure for installing a single standalone termination unit using a 120 Vac or 230 Vac power supply (Model 7924-A1-20x or 7924-A1-30x).

If you have multiple standalone units at the same location, you may want to consider installing the units in a HotWire Model 7900 10-Slot Standalone Shelf. The Standalone Shelf is a convenient method for housing up to ten standalone termination units and uses only a single power source.

HotWire Model 7924-A1-50x units (which use −48 Vdc direct power) must be installed in a HotWire 7900 10-Slot Standalone Shelf. Installation instructions for these models are not provided in this User's Guide.

To obtain information on the Standalone Shelf, refer to *Product-Related Documents* on page vi.

Package Checklist for HotWire Model 7924-A1

Verify that your package contains the following:

❏ HotWire Model 7924-A1 unit

❏ VT100 Terminal Cable

❏ 14′ twisted-pair network cable

❏ Power cord with power transformer (optional)

❏ Warranty card

Connecting to the Network

▶ **Procedure**

1. Connect one end of the supplied 14′ twisted-pair network cable into the rear panel HDSL jack. Connect the other end to your HDSL network interface.

   NOTE:

   Do *not* use a flat VF network cable, as this may severely degrade the performance of the termination unit. Use only a twisted-pair network cable.

2. Connect a V.35 or DSX-1 interface cable into the appropriate connector on the rear panel. Connect the other end to your V.35 or DSX-1 equipment.

HotWire 7924 V.35-compatible units are not designed to be used at both ends of an HDSL connection.

Connecting Power to the Unit
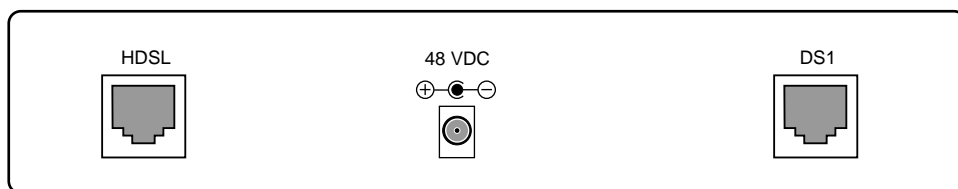
97-15356-01

DSX-1-Compatible HotWire 7924 – Rear Panel
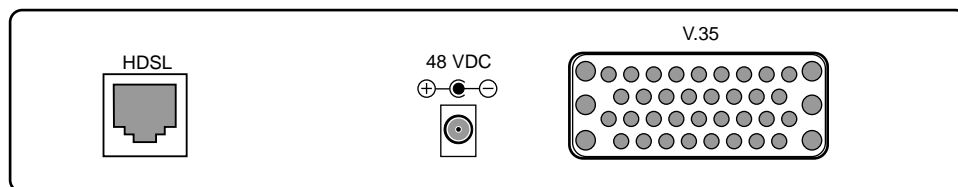
97-15264

V.35-Compatible HotWire 7924 – Rear Panel

Plug the power transformer into the appropriate (115 or 230 Vac) power outlet. Connect the power lead into the −48 Vdc jack on the rear panel.

To obtain information on the power supplies and power cord adapters available, refer to *Warranty, Sales, and Service Information* on page A at the beginning of this User's Guide.

Using Terminal and Switchpack Modes

3

Choosing an Interface Mode

You can make configuration changes either through an asynchronous terminal (Terminal Mode) or by manually changing switches and jumpers on the board (Switchpack Mode). Terminal Mode is the default setting.

In Terminal Mode:

- You change configuration parameters by selecting menu options that appear on a VT100-compatible terminal attached to the front panel of the termination unit.

- The standalone unit is preconfigured at the factory for CP (customer premises) operation.

In Switchpack Mode:

- You change configuration parameters by moving switchpacks and jumpers on the board.

- The standalone unit is not preconfigured. You must ensure that the switchpacks and jumpers are set as desired.

- You can still display information about the unit from the terminal and run loopback tests.

- Any changes you make in Terminal Mode are lost when you change to Switchpack Mode.

Connecting to a System Terminal

An optional system maintenance terminal is attached to your Model 7924 standalone termination unit through the modular jack on the front panel. Terminals can be attached to both endpoints (CO and CP).

The system terminal must be a VT100-compatible terminal or a PC running emulation software.

Connect the 9-pin end of the terminal cable into a COM port on your PC. Plug the other end into the modular jack on the termination unit's front panel. If your PC requires a 25-pin connector to the COM port, see Appendix B, *Cable Pin Assignments*, for the correct cable pinouts.

Make sure the terminal parameters on your terminal or PC are set to:

- 9600 Kbps

- 8 bit character

- No parity bit

- 1 stop bit

- No flow control

Press Return at your terminal to activate the Main Menu. The system runs diagnostics and status checks as it comes up. After a few seconds, the Main Menu screen appears on your terminal. Menus are described in Chapters 4 and 5 for the DSX-1 and V.35 units, respectively.

Switching Between Terminal and Switchpack Modes

The following procedure is used to change the operating mode of the unit to either Terminal Mode (the default setting) or Switchpack Mode. Refer to Chapter 4 (for DSX-1-compatible units) or Chapter 5 (for V.35-compatible units) for information on changing configuration options using either of these modes.

▶ **Procedure**

Use electrostatic discharge protection when handling the circuit board.

To change the mode:

1. Power down the unit and expose the circuit board by loosening the two screws on the back panel of the unit and sliding off the cover.

2. See Appendix C, *Switchpacks and Jumpers*, for jumper locations on your unit's board.

   — Use jumper P11 for DSX-1-compatible units.

   — Use jumper P8 for V.35-compatible units.

3. Place the jumper in the correct position for the desired mode.

   — Switchpack Mode is configured by placing the jumper on Pins 2 and 3.

   — Terminal Mode is configured by placing the jumper on Pins 1 and 2.

4. *If you are enabling Switchpack Mode:* You must set the switchpacks and jumpers to your desired configuration. Refer to Appendix C, *Switchpacks and Jumpers*.

5. Replace the cover and screws.

6. Power up the board to reset and enable the new configuration.

Customizing DSX-1-Compatible Units

4

Accessing Configuration Options

This chapter explains how to change configuration options for HotWire 7924-A1 standalone units that are DSX-1-compatible. Chapter 5 provides similar information for V.35-compatible units.

Configuration option settings determine how the unit operates. You can change a unit's configuration options by:

■ Selecting the Board Configuration branch of the Main Menu while in Terminal Mode.

■ Changing switchpack and jumper settings on the circuit board while in Switchpack Mode.

The Main Menu for a DSX-1-compatible unit on the customer premises (CP) side appears as follows:

```
Command→  G123 ───────────────────   The G123 code denotes
                                      a successful startup
ATTX – CP – T1 Rate – LOOP AB

T1 HDSL HTUR Main Menu ─────────┐     CP units are HDSL Termination
                                │     Units – Remote (HTUR)
1) Board Status                 │     CO units are HDSL Termination
2) Performance Monitor          │     Units – Central Office (HTUC)
3) Board Configuration          │
4) Board Reset                  │
5) CP Local Loopback            │
6) CP Remote Loopback           │
7) HTUC Menu ───────────────────┘
?) Redisplays this Menu


Command→
```

This guide depicts the system terminal menus as they appear from a CP unit. This is the default configuration for Model 7924 standalone units.

Making Changes from the Terminal Interface

The Board Configuration menu displays the current board software and hardware settings. It also allows you to change certain parameters on the board.

This function is affected by the status of the switchpack (DIP switch control) setting.

■ When operating in Terminal Mode (the system default) you can make configuration changes through the terminal menus.

■ When operating in Switchpack Mode, you can display configuration parameters using the terminal menus, but any configuration changes must be made using the switchpacks and jumpers on the board hardware. Refer to *Making Changes in Switchpack Mode* on page 4-5.

To access the Board Configuration menu, enter **3** at the Main Menu Command prompt.

```
Command→ 3

Board Configuration:

1) HDSL Card Type       – CP
   HDSL Rate Type       – T1
2) Loops Enabled        – Dual Loop (Loops A and B)
3) T1 Line Encode       – B8ZS
4) Framing              – D4
5) Line Build Out       – 0 to 133 feet, 0dB
   HDSL FW Rev          – 07
   AT+T FW Rev          – 1.17
   CP Serial #          – 085561


--------------------------------------------------------

1-5)   Board Configuration
6)     Switch pack Definitions
7)     Line Build-Out Definitions
?)     Redisplays this menu
Q)     Quit

Config→
```

Possible values for each parameter are listed in Table 4-1. See Appendix A, *Worksheets*, for help in selecting the appropriate configuration options for your application.

Table 4-1.   DSX-1-Compatible Units Configuration Options (1 of 2)

1) HDSL Card Type
Possible Settings: **CP, CO** Default Setting: **CP**
Indicates the placement of the unit in the network configuration. To toggle the card type, enter **1** at the Config prompt. **CP** – Unit is on the customer premises (remote) side of the HDSL connection. **CO** – Unit is on the central office (or central site) side of the HDSL connection.
2) Loops Enabled
Possible Settings: **Single**, **Dual** Default Setting: **Dual**
Specifies which loops on the HDSL line are to be used in the connection. To change the loops that are enabled, enter **2** at the Config prompt. The system then prompts you to specify either (S)ingle or (D)ual Loops. **Dual** – Loops A and B are enabled. **Single** – Only Loop A is enabled.
3) T1 Line Encode
Possible Settings: **B8ZS, AMI** Default Setting: **B8ZS**
Specifies the type of line encoding used to ensure ones density in the transmission signal. To toggle the encoding method, enter **3** at the Config prompt. **B8ZS** – Binary 8 Zero Substitution. **AMI** – Alternate Mark Inversion.
4) Framing
Possible Settings: **D4, Extended Superframe, Unframed** Default Setting: **D4**
Specifies the type of framing to be used. To toggle the framing method, enter **4** at the Config prompt. **D4** – Commonly used framing method on T1 circuits, consisting of 12 frames of 192 bits with the 193rd bit used for error checking and other functions. Also called Super Framing. **Extended Superframe** – Framing method consisting of 24 frames of 192 bits each, with the 193rd bit providing timing and other functions. An enhanced version of D4. **Unframed** – Framing is disabled. NOTE: When connecting to a V.35-compatible unit, refer to page A-4 for more information before selecting this option.

Table 4-1.   DSX-1-Compatible Units Configuration Options (2 of 2)

5) Line Build Out
Possible Settings: **0 to 133 ft, 133 to 266 ft, 266 to 399 ft, 399 to 533 ft, 533 to 655 ft** Default Setting: **0 to 133 ft**
To change the line build-out length, enter **5** at the Config command prompt. You will then be prompted to select from the following options: **1) 0 to 133 ft** **2) 133 to 266 ft** **3) 266 to 399 ft** **4) 399 to 533 ft** **5) 533 to 655 ft** **N) No change**   NOTE: Additional options may be displayed on your terminal. These other options (for –7.5, –15, and –22.5 dB) are not for use with this product. Use of these options will cause a weak signal and degrade performance. Select from options 1 through 5 only.

You must reset the board for changes to the card type or loops enabled (options 1 or 2) to take effect. A system message is displayed on the terminal to remind you to reset the board. To reset the board, choose option 4 from the Main Menu or cycle the power to the board.

All configuration settings are stored in nonvolatile memory and are not affected by the reset.

The HDSL rate type, firmware revision numbers, and the serial number displayed on the Board Configuration screen cannot be changed.

Making Changes in Switchpack Mode

When operating in Switchpack Mode, you can change configuration options by moving switches on the board hardware.

To enable Switchpack Mode, refer to *Switching Between Terminal and Switchpack Modes* in Chapter 3, *Using Terminal and Switchpack Modes.*

▶ **Procedure**

Use electrostatic discharge (ESD) protection when handling the circuit board.

To open the unit and make changes while in Switchpack Mode:

1. Power down the unit and expose the circuit board by loosening the two screws on the back panel of the unit and sliding off the cover.

2. Refer to the board layout illustration in Appendix C, *Switchpacks and Jumpers*, to locate switchpack S1.

3. Place the switchpack in the correct position for each desired configuration option. Definitions of switchpack positions are provided in Appendix C, *Switchpacks and Jumpers*.

   For example, to change a unit's card type from CO to CP, move switch 1 on switchpack S1 to the OFF position.

4. Replace the cover and screws.

5. Power up the board to reset and enable the new configuration.

Displaying Switchpack Definitions

Enter **6** at the Config prompt to display the definition of each position in the switchpack. Switchpack definitions are also listed in Appendix C, *Switchpacks and Jumpers*.

```
Config→ 6

Switch pack definition: (OFF=0, ON=1)

1    - CO/CP                   OFF=CP, ON=CO
2    - B8ZS                    OFF/ON
3    - Dual/Single Loop Mode   OFF=Dual, ON=Single
4    - Line Build Out Bit 0
5    - Line Build Out Bit 1
6    - Line Build Out Bit 2
7,8  - 00=Unframed, 01=D4
       11=ESF

Config→
```

Displaying Line Build-Out Definitions

Enter **7** at the Config prompt to display the switchpack and board settings for line build-out. Use this information to change the line build-out parameter manually. (Switchpack definitions are also listed in Appendix C, *Switchpacks and Jumpers*.)

```
Config→ 7

*****   SWITCHPACK SETTINGS FOR LINE BUILD OUT  *******

  Switchpack Settings
-----------------------------------
Position #4 – Bit 0    OFF=0, ON=1
Position #5 – Bit 1    OFF=0, ON=1
Position #6 – Bit 2    OFF=0, ON=1

************ Switchpack Definitions ************
Bit 2    Bit 1    Bit 0 Application
-------------------------------------------------
  0        0        0      0 to 133 feet – 0dB
  0        0        1      133 to 266 feet
  0        1        0      266 to 399 feet
  0        1        1      399 to 533 feet
  1        0        0      533 to 655 feet
  1        0        1      -7.5 dB
  1        1        0      -15 dB
  1        1        1      -22.5 dB

Config→
```

For example, to change the line build-out to 399 to 533 feet, while in Switchpack Mode, set position 6 OFF and positions 4 and 5 ON.

NOTE:

The switch combinations for –7.5, –15, and –22.5 dB line build-out are not for use with this product. Use of these settings will cause a weak signal and degrade performance.

Customizing V.35-Compatible Units

5

Accessing Configuration Options

This chapter explains how to change configuration options for HotWire 7924-A1 models that are V.35-compatible. Chapter 4 provides similar information for DSX-1-compatible units.

Configuration option settings determine how the unit operates. You can change a unit's configuration options by:

- Selecting the Board Configuration branch of the Main Menu while in Terminal Mode.

- Changing switchpack and jumper settings on the circuit board while in Switchpack Mode.

The Main Menu for a V.35-compatible unit on the customer premises (CP) side appears as follows:

```
Command→  G123 ──────────────────────  The G123 code denotes
                                        a successful startup

ATTX – CP – T1 – LOOP AB
V.35 T1 HDSL HTUR Main Menu ─────────┐  CP units are HDSL Termination
                                     │  Units – Remote (HTUR)
                                     │  CO units are HDSL Termination
1) Board Status                      │  Units – Central Office (HTUC)
2) Performance Monitor               │
3) Board Configuration               │
4) Board Reset                       │
5) CP Local Loopback                 │
6) CP Remote Loopback                │
7) HTUC Menu ────────────────────────┘
?) Redisplays this Menu


Command→
```

This guide depicts the system terminal menus as they appear from a CP unit. This is the default configuration for Model 7924 standalone units.

Making Changes from the Terminal Interface

The Board Configuration menu displays the current board software and hardware settings. It also allows you to change certain parameters on the board.

This function is affected by the status of the switchpack (DIP switch control) setting.

- When operating in Terminal Mode (the system default) you can make configuration changes through the terminal menus.

- When operating in Switchpack Mode, you can display configuration parameters using the terminal menus, but any configuration changes must be made using the switchpacks and jumpers on the board hardware. Refer to *Making Changes in Switchpack Mode* on page 5-4.

To access the Board Configuration menu, enter **3** at the Main Menu Command prompt.

```
Command→ 3

Board Configuration:

   1)  HDSL Card Type      – CP
       HDSL Interface/Rate – V.35 T1
   2)  Loops Enabled       – Dual Loop (Loops A and B)
   3)  Payload Rate        – 1536 Kbps (24x64)
       Transmit Timing     – Loop
       HDSL FW Rev         – 03
       AT+T FW Rev         – 1.17
       CP Serial #         – 85649


--------------------------------------------

1–3)   Board Configuration
4)     Switch pack Definitions
?)     Redisplays this menu
Q)     Quit

Config→
```

Possible values for each parameter are listed in Table 5-1. See Appendix A, *Worksheets*, for help in selecting the appropriate configuration options for your application.

Table 5-1.   V.35-Compatible Units Configuration Options

1) HDSL Card Type
Possible Settings: **CP, CO** Default Setting: **CP**
Indicates the placement of the unit in the network configuration. To toggle the card type, enter **1** at the Config prompt.
CP – Unit is on the customer premises side of the HDSL connection.
CO – Unit is on the central office (or central site) side of the HDSL connection.
2) Loops Enabled
Possible Settings: **Single**, **Dual** Default Setting: **Dual**
Specifies which loops on the HDSL line are to be used in the connection. To change the loops that are enabled, enter **2** at the Config prompt. The system then prompts you to specify either (S)ingle or (D)ual Loops.
Dual – Loops A and B are enabled.
Single – Only Loop A is enabled.
3) Payload Rate
Possible Settings: **1 through 9 (for 64 through 1536 kbps)** Default Setting: **9 (1536 kbps)**
Specifies the desired payload rate. **1** – 1 x 64 (64 kbps)   **6** – 8 x 64 (512 kbps) **2** – 2 x 64 (128 kbps)   **7** – 12 x 64 (768 kbps) **3** – 3 x 64 (192 kbps)   **8** – 16 x 64 (1024 kbps) **4** – 4 x 64 (256 kbps)   **9** – 24 x 64 (1536 kbps) **5** – 6 x 64 (384 kbps)   **N** – No change to rate Options 8 and 9 (1024 and 1536 kbps) are only available when Loops A and B are enabled. If only Loop A is enabled, the maximum payload rate is 768 kbps (option 7).

You must reset the board for changes to the card type or loops enabled (options 1 or 2) parameters to take effect. A system message is displayed on the terminal to remind you to reset the board. To reset the board, choose option 4 from the Main Menu or cycle the power on the board.

All configuration settings are stored in nonvolatile memory and are not affected by the reset.

The transmit timing, HDSL interface/rate, firmware revision numbers, and serial number displayed on the Board Configuration screen cannot be changed.

Making Changes in Switchpack Mode

When operating in Switchpack Mode, you can change configuration options by moving switches on the board hardware.

To enable Switchpack Mode, refer to *Switching Between Terminal and Switchpack Modes* in Chapter 3, *Using Terminal and Switchpack Modes.*

▶ **Procedure**

Use electrostatic discharge (ESD) protection when handling the circuit board.

To open the unit and make changes while in Switchpack Mode:

1. Power down the unit and remove the enclosure cover, exposing the circuit board.

2. Find the switchpack for the configuration options you wish to change. Switchpack positions are defined in Appendix C, *Switchpacks and Jumpers*.

3. Place the switchpacks in the correct position for each desired configuration option. The switchpacks are not preconfigured.

   For example, to change a unit's card type from CO to CP, move switch 1 on switchpack S1 to the OFF position.

4. Verify that switches 4 and 5 on switchpack S1 are set to ON and OFF, respectively.

5. Replace the cover and screws.

6. Power up the board to reset and enable the new configuration.

Displaying Switchpack Definitions

Enter **4** at the Config prompt to display the definition of each position in the two switchpacks. Switchpack definitions are also listed in Appendix C, *Switchpacks and Jumpers*.

```
Config→ 4

Switch pack 1 definition:
   1      -   CO/CP                          OFF=CP, ON=CO
   2      -   Dual/Single Loop Mode      OFF=Dual, ON=Single
   3      -   Not Used
   4,5    -   00, 11 Invalid
              01 = Invalid, 10 = Loop Timing
   6-8    -   Not Used

Switch pack 2 definition:
   1  -   64 Kbps   (1x64)     OFF=0, ON=1
   2  -   128 Kbps  (2x64)     OFF=0, ON=1
   3  -   192 Kbps  (3x64)     OFF=0, ON=1
   4  -   256 Kbps  (4x64)     OFF=0, ON=1
   5  -   384 Kbps  (6x64)     OFF=0, ON=1
   6  -   512 Kbps  (8x64)     OFF=0, ON=1
   7  -   768 Kbps  (12x64)    OFF=0, ON=1
   8  -   1024 Kbps (16x64)    OFF=0, ON=1
   All switches off = 1536 Kbps (24x64)

Config→
```

Monitoring the Unit

6

What to Monitor

This chapter presents information on how to access and monitor status and performance statistics for the unit and its network connection. You can monitor operations by viewing the:

- Board Status option from the Main Menu

- Performance Monitor option from the Main Menu

- Board Status and Performance Monitor options from the HTUC (or HTUR) menu (for displaying information about the unit on the other end of the connection)

- Front Panel LEDs

Board Status

Board Status option from the Main Menu displays HDSL circuit operational status. Enter **1** at the Main Menu Command prompt to display board status.

```
Command→ 1

T1 STATUS:        Network is UP

LOOPBACK STATUS: OFF

HDSL STATUS:      LOOP A is UP, LOOP B is UP

S/N RATIO:        Loop A = 44.0 dB, Loop B = 43.5 dB

Command→
```

Board Status for DSX-1-Compatible Unit

```
Command→ 1

DTR:             ACTIVE
DSR:             ACTIVE

LOOPBACK STATUS: OFF

HDSL STATUS:      LOOP A is UP, LOOP B is UP

S/N RATIO:        Loop A = 44.0 dB, Loop B = 43.5 dB.

Command→
```

Board Status for V.35-Compatible Unit

- **T1 STATUS** displays one of the following:
    - Network is Up
    - Receive Carrier Loss
    - Receive Remote Alarm
    - Receive Unframed All 1's.
- **DTR** and **DSR** are either ACTIVE or INACTIVE. DSR becomes active in response to DTR (with HDSL loops up and data transmission possible).
- **LOOPBACK STATUS** is either ON or OFF.
- **HDSL STATUS** displays whether each loop is UP, DOWN, or DISABLED.
- **S/N** (Signal-to-Noise) **RATIO** is not displayed if loops are down or disabled.

Performance Statistics

Performance monitoring allows detailed observations of error conditions detected on the circuits. Performance Monitor statistics can be displayed in defined time periods from the previous minute to the previous 24 hours, plus a running total. These statistics can be cleared and restarted at any time.

Performance statistics are updated every second.

Enter **2** at the Main Menu Command prompt to display the Performance Monitor menu.

```
Command→ 2

Time Since Board Power–Up or Reset: 0000d 00h 00m 00s
1   – 1 minute stats.
2   – 15 minute stats.
3   – 1 hour stats.
4   – 12 hour stats.
5   – 24 hour stats.
6   – Running total.
7   – Clear Statistics.
Q   – Quit

stats→
```

Select a time frame from the list to display statistics for a specified time period.

Accumulated performance statistics may be cleared and restarted by selecting option **7** on the Performance Monitor menu.

NOTE:

Be sure you want to clear all statistics before pressing 7. There is no verification dialog.

```
stats→ 1

Current 1 minute:
HDSL Errors:            T1 Errors:


FAW LoopA  -  0         BPV -  0
FAW LoopB  -  0         CRC -  0
CRC LoopA  -  0         MOS -  0
CRC LoopB  -  0
FEBE LoopA -  0
FEBE LoopB -  0


Previous 1 minute:

FAW LoopA  -  0         BPV  -  0
FAW LoopB  -  0         CRC -  0
CRC LoopA  -  0         MOS -  0
CRC LoopB  -  0
FEBE LoopA -  0
FEBE LoopB -  0


stats→
```

Performance Statistics for DSX-1-Compatible Unit

```
stats→ 1

Current 1 minute:
HDSL Errors:
FAW LoopA     0
FAW LoopB     0
CRC LoopA     0
CRC LoopB     0
FEBE LoopA    0
FEBE LoopB    0

Previous 1 minute
HDSL Errors:
FAW LoopA     0
FAW LoopB     0
CRC LoopA     0
CRC LoopB     0
FEBE LoopA    0
FEBE LoopB    0


stats→
```

Performance Statistics for V.35-Compatible Unit

The type of statistics displayed under the T1 Errors column depends on the type of framing selected. When the unit is configured for D4 framing, FAS (Frame Alignment Signal) errors are reported. When the unit is configured for ESF framing, CRC (Cyclic Redundancy Check) errors are reported.

Refer to the *Glossary* for definitions of the errors reported.

Remote Unit Information

The same type of information provided for the locally attached unit can also be displayed (but not changed) for the unit on the other side of the connection.

You can display information about the CO unit by using the HTUC menu options from a terminal attached to the CP unit, and you can display information about the CP unit by using the HTUR menu options from a terminal attached to the CO unit.

To access the HTUC or HTUR menu, enter **7** at the Main Menu Command prompt.
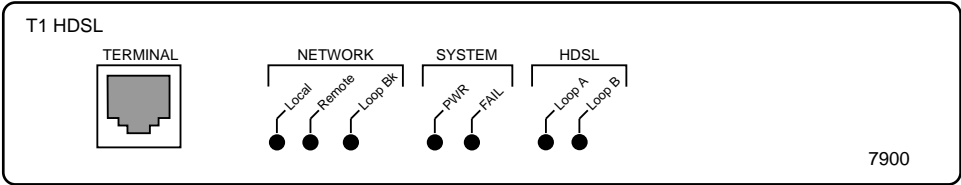
```
***** HTUC Menu *****
1)  Board Status
2)  Performance Monitor
3)  Board Configuration
4)  Line Build Out Configuration Help
?)  Redisplays this Menu
Q)  Quit


HTUC Command→
```

Front Panel LEDs

DSX-1-Compatible Unit

Upon power up, the first three LEDs blink in sequence, indicating a successful start configuration. The green PWR LED lights whenever power is applied to the board. Loop LEDs blink until the loop has been synchronized and then remain off.
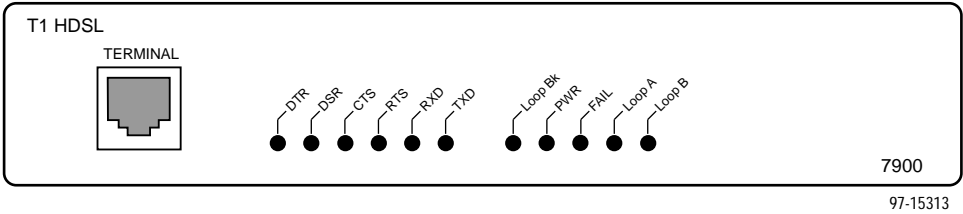

97-15312

LED	Meaning
Local	ON: The local T1 interface has a loss of signal.
Remote	ON: The remote T1 interface has a loss of signal.
Loop Bk	ON: A loopback has been initiated for testing the equipment connected to this unit. Refer to Chapter 7, *Testing,* for more information.
PWR	ON: Power is applied to the unit.
FAIL	ON: The processor has halted and repairs are required.
Loop A	ON: HDSL Loop A has failed. Blinking: HDSL Loop A is synchronizing with the far-end unit (such as when the units are coming up after a reset). If the LED blinks for more than 60 seconds, loss of signal has occurred. Off: Loop A is enabled and synchronized.
Loop B	ON: HDSL Loop B has been disabled (only Loop A is in use) or has failed. Blinking: HDSL Loop B is synchronizing with the far-end unit (such as when the units are coming up after a reset). If the LED blinks for more than 60 seconds, loss of signal has occurred. Off: Loop B is enabled and synchronized.

V.35-Compatible Unit

The green PWR LED lights whenever power is applied to the board. Loop LEDs blink until the loop has been synchronized and then remain off.

97-15313

LED	Meaning
Loop Bk	ON: A loopback has been initiated for testing the equipment connected to this unit. Refer to Chapter 7, *Testing,* for more information.
PWR	ON: Power is applied to the unit.
FAIL	ON: The processor has halted and repairs are required.
Loop A	ON: HDSL Loop A has failed. Blinking: HDSL Loop A is synchronizing with the far-end unit (such as when the units are coming up after a reset). If the LED blinks for more than 60 seconds, loss of signal has occurred. Off: Loop A is enabled and synchronized.
Loop B	ON: HDSL Loop B has been disabled (only Loop A is in use) or has failed. Blinking: HDSL Loop B is synchronizing with the far-end unit (such as when the units are coming up after a reset). If the LED blinks for more than 60 seconds, loss of signal has occurred. Off: Loop B is enabled and synchronized.

Testing

7

Detecting a Problem

The unit can detect and report problem conditions and perform diagnostic tests. The unit offers a number of indicators to alert you to possible problems, as described in Chapter 6, *Monitoring the Unit*:

■ Front Panel LEDs

■ Board status and performance statistics

■ Remote unit board status and performance statistics

Understanding Loopback Tests

Loopback is a diagnostic function that enables a technician to isolate equipment on the HDSL circuit to determine where on the circuit trouble may be occurring. Loopback takes the system off-line. Data received from the DTE (T1 or V.35 application equipment) is looped back, as depicted in Figures 7-1 through 7-4.

"Local" and "remote" refer to the point at which the data is looped back. In a local loopback the data is reflected back by the local unit (the unit that initiated the loopback). In a remote loopback, the data is passed on to the remote (far-end) unit and then reflected back.

Loopback tests are initiated through the terminal interface from either the CO or CP side of the HDSL connection.

Local Loopbacks

■ When a local loopback is enabled, the red Loop Bk LED on the front panel of the initiating unit lights up and remains lit until the loopback is disabled.

■ The data flow is indicated by the bold thick arrows in Figures 7-1 and 7-2.

■ When the CO initiates a local loopback, an Alarm Indication Signal (AIS) is received at the CP end (only if the CP end is G.703-compatible). (AIS is not received at V.35-compatible CP units.)
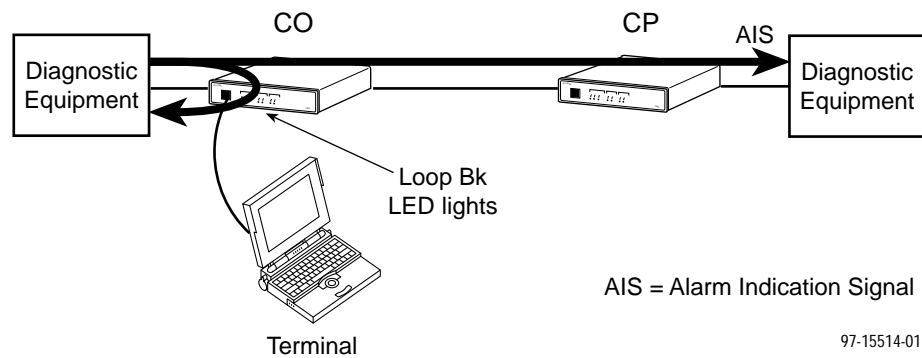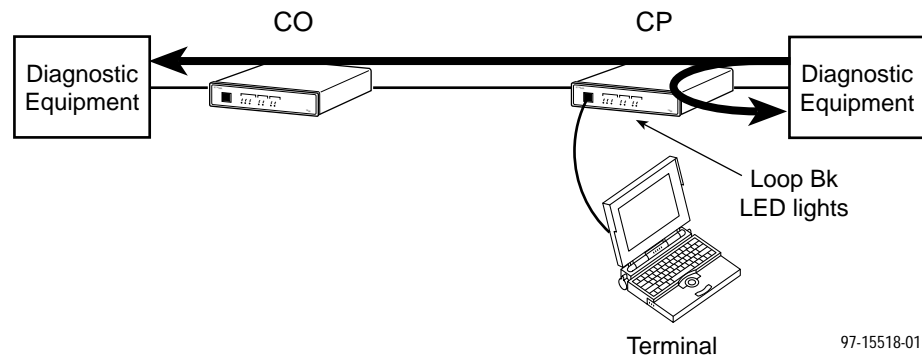

Figure 7-1.   Local Loopback, Initiated at the CO Unit

Figure 7-2.   Local Loopback, Initiated at the CP Unit

Remote Loopbacks

- When a remote loopback is enabled, the red Loop Bk LED on the front panel of the remote-end unit (CO or CP) lights up and remains lit until the loopback is disabled. The loopback LED on the initiating unit does not light.

- A message appears on the remote-end unit reporting that it has been put into loopback.

- The data flow is indicated by the bold thick arrows in Figures 7-3 and 7-4.

- When the CO initiates a remote loopback, an Alarm Indication Signal (AIS) is received at the CP end (only if the CP end is G.703-compatible). (AIS is not received at V.35-compatible CP units.)
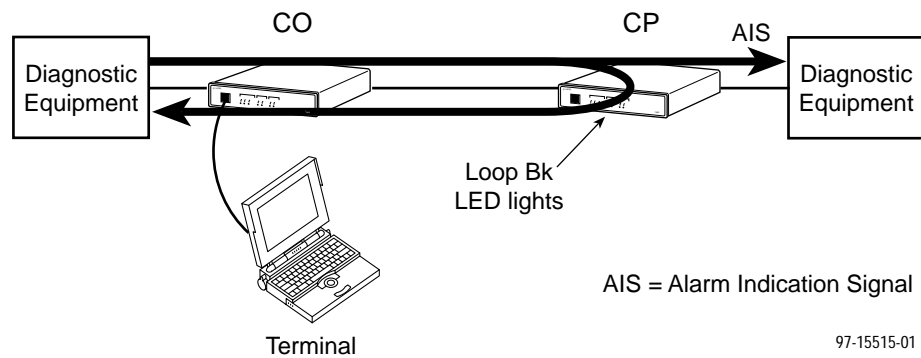

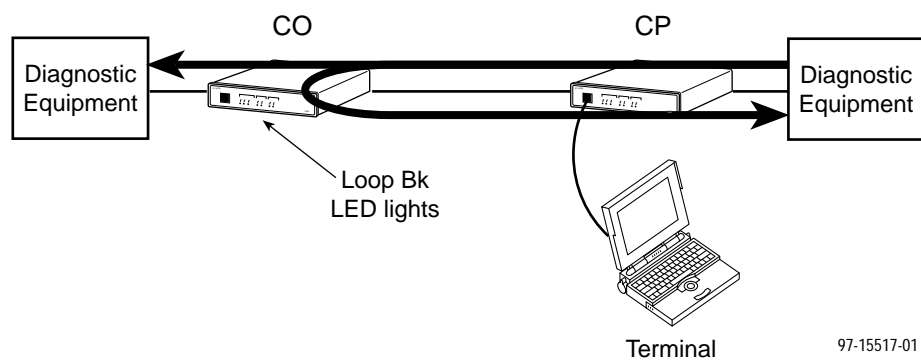**Figure 7-3.   Remote Loopback, Initiated at the CO Unit**

Figure 7-4.   Remote Loopback, Initiated at the CP Unit

Starting and Stopping Loopbacks

To start or stop a local loopback test, enter **5** at the Main Menu Command prompt.

```
Command→ 5

Local Loopback is Enabled!

Command→ 5

Local Loopback is Disabled!
```

To start or stop a remote loopback test, enter **6** at the Main Menu Command prompt.

```
Command→ 6

Remote Loopback is Enabled!

Command→ 6

Remote Loopback is Disabled!
```

- When you stop a loopback test (local or remote), both units automatically reset themselves in order to return to normal operation.

- A loopback may not be started on units that have just been reset. After a reset, the units require approximately one minute for the circuit (HDSL connection) to stabilize. If you attempt to start a loopback during this time, the following error message appears: "PLEASE WAIT! Circuit is stabilizing."

- Only one loopback may be run at a time. If a loopback is already enabled, the following error message appears and no other loopback may be started until the first loopback is disabled: "CANNOT EXECUTE COMMAND! Current loopbacks must be removed first."

Resetting the Unit

To reset the board, enter **4** at the Main Menu Command prompt. This is equivalent to cycling the power.
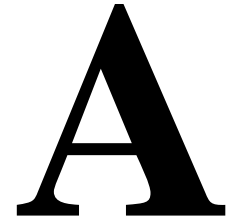
```
Command→ 4

Reset will bring the loops down. Are you sure? (y/n)

Command→
```

If "y" is selected, the Main Menu reappears, the loops go down, and the FAIL (reset) LED lights up.

Pressing any key other than "y" is interpreted as an "n".

Worksheets

A

Overview

The worksheets in this appendix show the correct configuration settings based on the types of units (DSX-1-compatible or V.35-compatible) on either end of the HDSL connection. There are two combinations of the two types of units:

- DSX-1-compatible units on both ends

- V.35-compatible unit on the CP end, DSX-1-compatible unit on the CO end

NOTE:

HotWire 7924 V.35-compatible units are not designed for use at *both* ends of an HDSL connection. If your application requires V.35 equipment at both ends of an HDSL connection, consider using two Hotwire 7925 E1 HDSL termination units. Contact your sales representative for more information.

DSX-1-to-DSX-1 Configuration
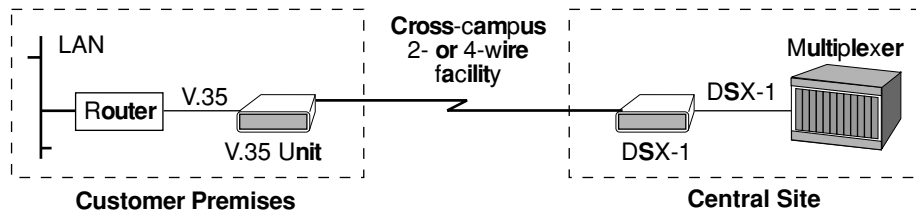

Customer Premises   Central Site
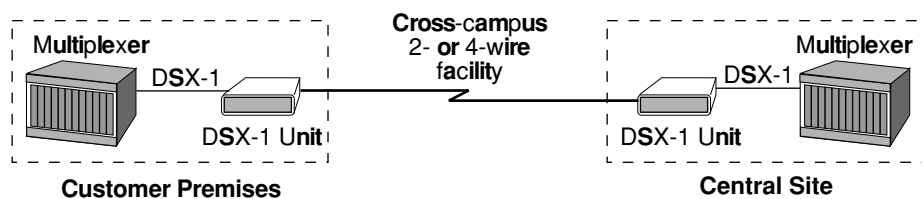
97-15296

To connect two DSX-1-compatible units, configure the units as follows. Terminal mode factory defaults are in bold (for Switchpack mode defaults, see Appendix C, *Switchpacks and Jumpers*).

Configuration Option	DSX-1-Compatible Unit (Customer Premises)	DSX-1-Compatible Unit (Central Site)
Card Type	**CP** (default)	CO
Loops Enabled	**Dual** (Loops A & B) or Single (Loop A)	Must be same as CP side
T1 Line Encode	**B8ZS** or AMI	Must be same as CP side
Framing	**D4**, Extended Superframe, or Unframed	Must be same as CP side
Line Build-Out	Enter **5** at the Config command prompt. Select from the following options: **1) 0 to 133 ft** 2) 133 to 266 ft 3) 266 to 399 ft 4) 399 to 533 ft 5) 533 to 655 ft	Enter **5** at the Config command prompt. Select from the following options: **1) 0 to 133 ft** 2) 133 to 266 ft 3) 266 to 399 ft 4) 399 to 533 ft 5) 533 to 655 ft

DSX-1-to-V.35 Configuration

97-15420

To connect a V.35-compatible unit on the CP side and a DSX-1-compatible unit on the CO side, configure the units as follows. Terminal mode factory defaults are in bold (for Switchpack mode defaults, see Appendix C, *Switchpacks and Jumpers*).

Configuration Option	V.35-Compatible Unit (Customer Premises)	DSX-1-Compatible Unit (Central Site)
Card Type	**CP**	CO
Loops Enabled	**Dual** (Loops A & B) or Single (Loop A)	Must be same as CP side
Payload Rate	1 – **9** (64 – **1536** kbps) Options 8 (1024 kbps) and 9 (1536 kbps) are only available if both Loops A & B are enabled.	N/A
Framing	N/A	Use **D4,** Extended Superframe, or Unframed. See *Unframed Operation* on page A-4 before selecting Unframed.
T1 Line Encode	N/A	**B8ZS** or AMI
Line Build-Out	N/A	Enter **5** at the Config command prompt. Select from the following options: **1) 0 to 133 ft** 2) 133 to 266 ft 3) 266 to 399 ft 4) 399 to 533 ft 5) 533 to 655 ft

Unframed Operation

Some units do not support unframed operation. To determine whether or not your DSX-1-compatible unit supports unframed operation when connected to a V.35-compatible unit, all three of the following conditions must be true:

1. The DSX-1-compatible unit must have a firmware revision number of seven (07) or higher.

   If you have a DSX-1-compatible *standalone* unit, display the HDSL FW (firmware) revision number by selecting the Board Configuration option (3) from the Main Menu (a system terminal is required).

   If you have a DSX-1-compatible *nest-mounted* unit, refer to the *HotWire Models 7924 and 7925 T1 and E1 HDSL Nest Card Termination Units User's Guide*.

2. The V.35-compatible unit must have an HDSL firmware revision number of three (03) or higher.

   To display the HDSL FW (firmware) revision number, select the Board Configuration option (3) from the Main Menu (a system terminal is required).

3. The V.35-compatible unit must have a hardware revision number of five (05) or higher.

   To determine the hardware revision number, look at the label on the bottom of the standalone unit that has the "CE" and "CSA" logos. The second row of numbers on this label should be "900P005705" or higher. The last two digits of this number (05) indicate the hardware revision number.

Time Slot (DS0) Assignments

When the V.35 payload rate is set for less than 1536 kbps, that payload rate determines which T1 DS0s are used, as follows:

V.35 Payload Rate	DSX-1 T1 DS0s Used
1 (64 kbps)	1
2 (128 kbps)	1, 2
3 (192 kbps)	1 – 3
4 (256 kbps)	1 – 4
5 (384 kbps)	1 – 6
6 (512 kbps)	1 – 8
7 (768 kbps)	1 – 12
8 (1024 kbps)	1 – 16

DSX-1-Compatible Units Configuration Worksheet

Board Configuration	
Configuration Option	**Settings** *Default in **Bold***
Card Type	**CP**, CO
Loops Enabled	**Dual**, Single
T1 Line Encode	**B8ZS**, AMI
Framing	**D4**, Extended Superframe, Unframed
Line Build Out	**1) 0 to 133 feet – 0 dB** 2) 133 to 266 feet 3) 266 to 399 feet 4) 399 to 533 feet 5) 533 to 655 feet

V.35-Compatible Units Configuration Worksheet

| Board Configuration	
Configuration Option	**Settings** *Default in **Bold***
Card Type	**CP**, CO
Loops Enabled	**Dual**, Single
Payload Rate	1 – 1 x 64 (64 kbps) 2 – 2 x 64 (128 kbps) 3 – 3 x 64 (192 kbps) 4 – 4 x 64 (256 kbps) 5 – 6 x 64 (384 kbps) 6 – 8 x 64 (512 kbps) 7 – 12 x 64 (768 kbps) 8 – 16 x 64 (1024 kbps)[1] **9 – 24 x 64 (1536 kbps)**[1] N – No change to rate
[1] Options 8 and 9 require Loops A and B.	

Cable Pin Assignments

# B

Terminal Connection Cable Pin Assignments

This section defines the pin assignments for the terminal cable from the front panel modular jack to your PC's COM port.

If your PC's COM port requires a 9-pin D-shell connector, the cable must use the following pin assignments.
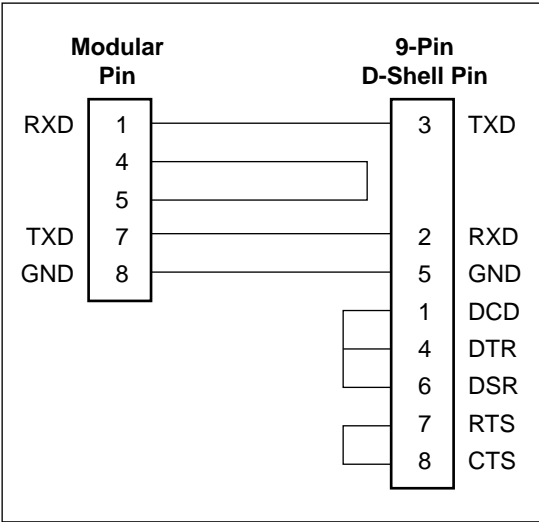
97-15268-02

If your PC's COM port requires a 25-pin D-shell connector, the cable must use the following pin assignments.

97-15442-01
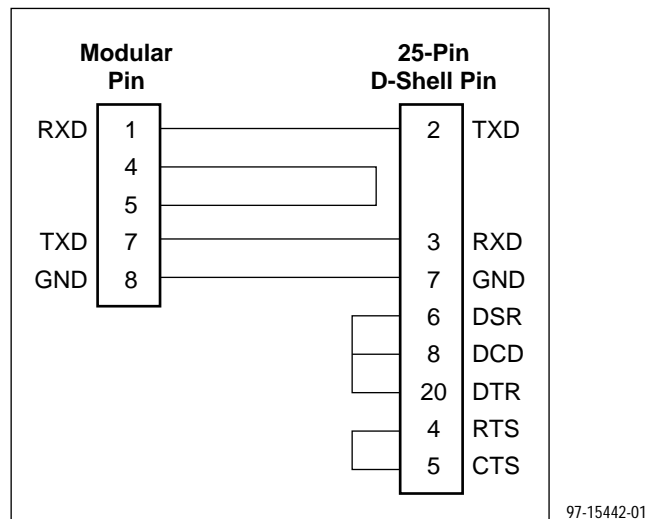
HDSL Loop Connection Cable Pin Assignments

The HDSL modular connector that plugs into the rear panel of the unit has the following pin assignments.

Pin	Signal
1	Loop A Tip
2	Loop A Ring
3	Loop B Tip
4	Loop B Ring
5 – 8	open

NOTE:

Pin 1 is on the left when viewing the jack from its inserted position.

T1 Network Connection Cable Pin Assignments

The modular connector that plugs into the rear panel of DSX-1-compatible units has the following pin assignments.

Pin	Signal
1	Tx Ring
2	Tx Tip
3	open
4	Rx Ring
5	Rx Tip
6 – 8	open

NOTE:

Pin 1 is on the left when viewing the jack from its inserted position.

V.35 Connection Cable Pin Assignments

The connector that plugs into the rear panel of V.35-compatible units has the following pin assignments.

CCITT Code	Pin	Name	Direction DCE DTE	Function	Description
101	A	PG		Protective Ground	Machine ground
102	B	SG		Signal Ground	Ground reference for all circuits
105	C	RTS	←	Request to Send	DTE has message to send
106	D	CTS	→	Clear to Send	DCE is ready to accept and transmit DTE data
107	E	DSR	→	Data Set Ready	DCE is ready to operate
109	F	RLSD	→	Data Channel Received Line Signal Detector	DCE is receiving a carrier signal
108	H	DTR	←	Data Receiver Ready	DTE is ready to operate
141	L	LL	←	Local Loopback	Local loopback
140	N	RDL	←	Loopback/Maintenance	Remote loopback
103	P	TXD	←	Transmit Data (A)	Data generated by DTE
104	R/D	RXD	→	Received Data (A)	Data received by DTE
103	S	TXD	←	Transmitted Data (B)	Data generated by DTE
104	R	RXD	→	Received Data (B)	Data received by DTE
113	U	EXT CLK	←	Transmitter Signal Element Time (A)	To help detect center of signaling element on BA
115	V	RSET	→	Receiver Signal Element Timing (A)	To help detect center of signaling element on BB
113	W	EXT CLK	←	Transmitter Signal Element Timing (B)	To help detect center of signaling element on BA
115	X	RSET	→	Receiver Signal Element Timing (B)	To help detect center of signaling element on BB
114	Y	TSET	→	Transmit Signal Element Timing (A)	To help detect center of signaling element on BA
114	a	TSET	→	Transmit Signal Element Timing (B)	To help detect center of signaling element on BB
142	n	TST	→	Test Indicator	Reserved for test

Switchpacks and Jumpers

C

DSX-1-Compatible Units

Use Figure C-1 to assist you in locating the switchpacks and jumpers on the board.

The jumper and switchpack detailed in Figure C-1 are used to change configuration options. All other jumpers (listed below) must remain as positioned at the factory.

Jumper	Pins (Factory-Setting)
P1	2–3
P3	No Jumper
P8	2–3
P9	2–3
P10	1–2
P11	1–2
P12	1–2

Switchpack S1

VT100 Terminal
Modular Jack

P1 P10

P3

S1

Jumper P11

P11

Pins*	Settings*
1-2	**Terminal Mode**
2-3	Switchpack Mode

Position	Settings*
1	OFF = CP **ON = CO**
2	OFF = AMI line encoding **ON = B8ZS line encoding**
3	OFF = Loops A and B **ON = Loop A**
4, 5, 6	**000 = 0–133 ft** 100 = 133–266 ft 010 = 266–399 ft 110 = 399–533 ft 001 = 533–655 ft
7, 8	00 = Unframed 01 = D4 **11 = ESF**

P8 P12

P9

97-15379-02

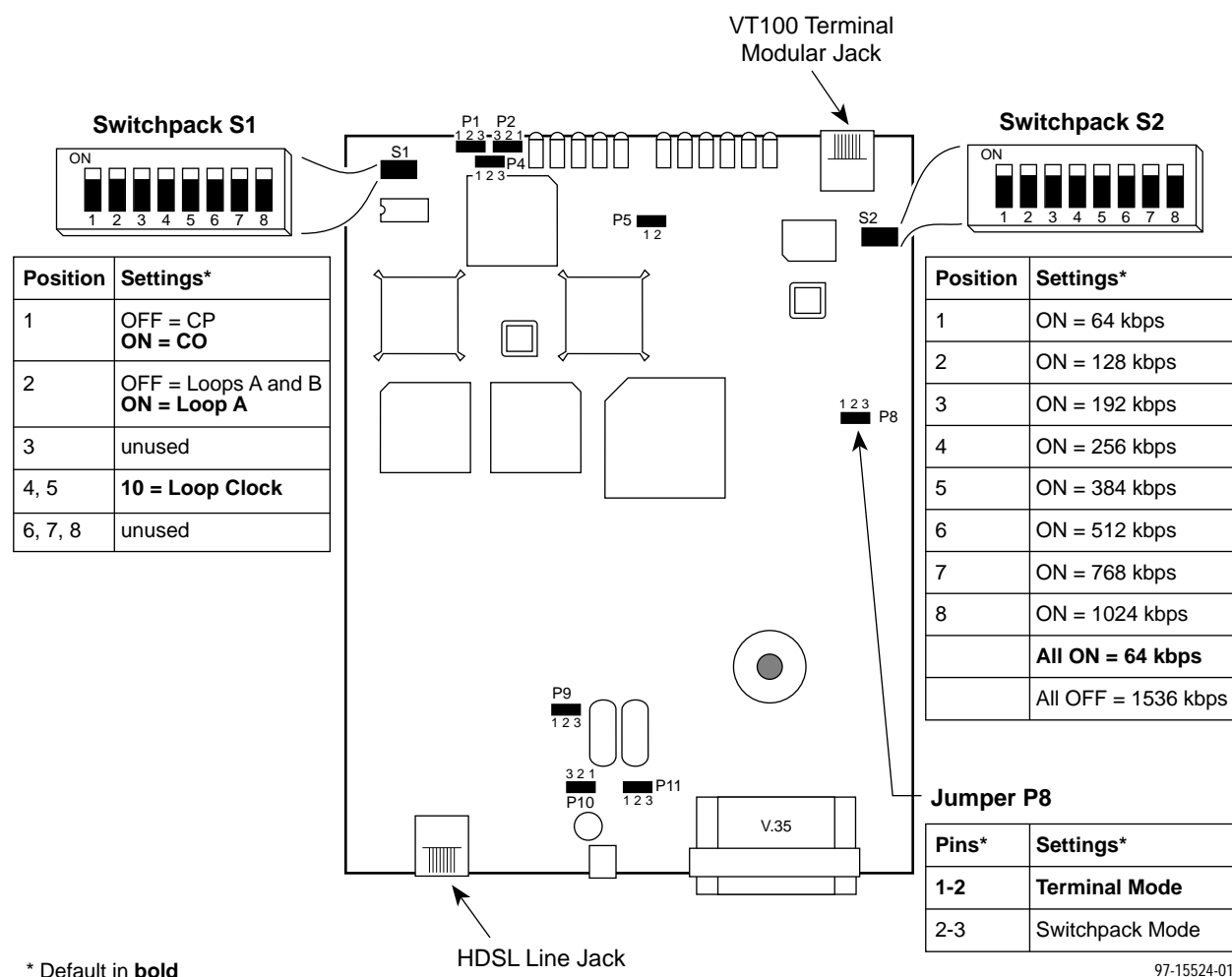* Default in **bold**

HDSL Line Jack

Figure C-1.   DSX-1-Compatible Unit Switchpack and Jumper Locations

■   Pin 1 on jumpers is labeled on the board.

■   The ON position is labeled on the switchpack.

■   Positions 4, 5, and 6 on Switchpack S1 work as a group. Set position 4 to the first digit, position 5 to the second digit, and position 6 to the last digit. For example, set 4 and 5 ON and 6 OFF for 399–533 ft.

■   Positions 7 and 8 on Switchpack S1 work as a pair. Set position 7 to the first digit and position 8 to the second digit. For example, set 7 OFF and 8 ON for D4 framing.

V.35-Compatible Units

Use Figure C-2 to assist you in locating the switchpacks and jumpers on the board.

The jumper and switchpacks detailed in Figure C-2 are used to change configuration options. All other jumpers (listed below) must remain as positioned at the factory.

Jumper	Pins (Factory-Setting)
P1	1–2
P2	1–2
P4	2–3
P5	No Jumper
P8	1–2
P9	2–3
P10	2–3
P11	1–2

Figure C-2.   V.35-Compatible Unit Switchpack and Jumper Locations

■   Pin 1 on the jumper is labeled on the board.

■   The ON position is labeled on the switchpacks.

■   Positions 4 and 5 on Switchpack S1 work as a pair. Position 4 should be ON and position 5 should be OFF. No other combinations are valid.

Switchpack S1

Position	Settings*
1	OFF = CP **ON = CO**
2	OFF = Loops A and B **ON = Loop A**
3	unused
4, 5	**10 = Loop Clock**
6, 7, 8	unused

Switchpack S2

Position	Settings*
1	ON = 64 kbps
2	ON = 128 kbps
3	ON = 192 kbps
4	ON = 256 kbps
5	ON = 384 kbps
6	ON = 512 kbps
7	ON = 768 kbps
8	ON = 1024 kbps
	All ON = 64 kbps
	All OFF = 1536 kbps

Jumper P8

Pins*	Settings*
1-2	**Terminal Mode**
2-3	Switchpack Mode

* Default in **bold**

HDSL Line Jack

97-15524-01

Glossary

AMI	Alternate Mark Inversion coding format.
BPV	Bipolar Violation. A type of error detected by using a modified bipolar signaling method in which a control code is inserted. Used with AMI coding format.
B8ZS	Bipolar with eights and Zeroes Substitution. An encoding scheme for transmitting clear channel signals over a T1 line.
CD	Carrier Detect. A signal indicating that energy exists on the transmission circuit. Associated with Pin 8 on an EIA-232 interface.
CO	Central Office. As used in this manual, CO denotes any central site as distinguished from the Customer Premises site.
COM port	Communications port. A computer's serial communications port used to transmit to and receive data from a DCE. The DCE connects directly to this port.
CP	Customer Premises.
CPE	Customer Premises Equipment. Terminating equipment supplied by either the customer or some other supplier that is connected to the telecommunications network (e.g., DSUs, terminals, phones, routers, modems).
CRC	Cyclic Redundancy Check. A commonly used method of error detection.
CTS	Clear to Send. An EIA-lead standard for V.24 circuit CT 106; an output signal (DCE-to-DTE).
CV	Code Violation. This is equivalent to a BPV. Used with HDB3 coding format.
DCE	Data Communications Equipment. The equipment that provides the functions required to establish, maintain, and end a connection. It also provides the signal conversion required for communication between the DTE and the network.
DSR	Data Set Ready. An EIA-lead standard for V.24 circuit CT 107; an output signal (DCE-to-DTE).
DSX-1	Digital Signal cross-connection (of network equipment) at T1 rates.
DS1	Digital Signal level 1. A framing specification for T1 circuits.
DTE	Data Terminal Equipment. The equipment, such as computers, printers, and routers, that provide or create data.
DTR	Data Terminal Ready. An EIA-lead standard for V.24 circuit CT 108; an input signal (DTE-to-DCE).
E1	A data signaling rate common outside the United States. A wideband interface operating at 2.048 Mbps defined by CCITT standards G.703 and G.704.
factory defaults	A predetermined set of configuration options for general operation.
FAS	Frame Alignment Signal. A loss of signal (LOS) error detection.
FAW	Frame Alignment Word. A loss of synchronization error detection.

FCC	Federal Communications Commission. Board of Commissioners that regulates all U.S. interstate, intrastate, and foreign electrical communication systems that originate from the United States.
FEBE	Far End Bit Error. Number of errors reported by the remote equipment.
HDB3	High Density Bipolar 3 coding format.
HDSL	High-bit-rate Digital Subscriber Loop. Provides high bandwidth, bi-directional transmission over copper wire for both T1 and E1 services.
HTU	Host Termination Unit. A generic reference to either an HTU-C or HTU-R module.
HTU-C	Host Termination Unit – Central. The module at the CO (central office) or central site end of an HDSL connection. Also known as a Network Termination Unit (NTU).
HTU-M	Host Termination Unit – Maintenance. A carrier–mounted module used to perform maintenance operations on one or more HTU-R and HTU-C modules.
HTU-R	Host Termination Unit – Remote. The module at the CP (customer premises) end of an HDSL connection. Also known as a Line Termination Unit (LTU).
LED	Light Emitting Diode. A status indicator that responds to the presence of a certain conditions.
loopback	Used to test various portions of a data link in order to isolate an equipment or data line problem. A diagnostic procedure that sends a test message back to its origination point.
MOS	Multiframes Out of Sync. A performance statistic that counts the number of multiframes received out of sync.
OOF	Out Of Frame. An error condition in which frame synchronization bits are in error. A network-reported condition.
reset	A reinitialization of the device that occurs at power-up or in response to a reset command.
RTS	Request to Send. An EIA-lead standard for V.24 circuit CT 105; an input signal (DTE-to-DCE).
RXD	Received Data. An EIA-lead standard for V.24 circuit CT 104; an output signal (DCE-to-DTE).
T1	A data signaling rate common in the United States. A term for a digital carrier facility used to transmit a DS1 formatted signal of 1.544 Mbps.
TXD	Transmit Data. An EIA-lead standard for V.24 circuit CT 103; an input signal (DTE-to-DCE).
V.35	ITU-T standard for a high-speed, 34-pin, DCE/DTE interface.

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